Matagorda and Lavaca Bays
Project Approach and Progress to Date

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Presented to Colorado – Lavaca Basin and Bay Area Stakeholder Committee

December 1, 2014

Trungale Engineering & Science
Dr. Tom Soniat, UNO
Dr. Bryan Black, UTMSI

Overview

- Review Existing Standards and Studies
- Oysters and Dermo
- Shellfish and Forage Fish
- Marsh Productivity
- *Rangia*
- Hydrodynamic Modeling

Review of Existing Standards

- BBEST Report
  - *"The recommended suite of Matagorda Bay Inflow Criteria for the Colorado River … was adopted from the MBHE study"*
  - Lavaca Bay analysis generally followed MBHE science
- BBASC Report
  - *"The Committee agreed to recommend that the BBEST recommended values, with certain limited adjustments, should be included in the environmental flow standards…"*
- Standards (March 9, 2012 TCEQ memo and 30 TAC §298.330(a)(2))
  - *"The proposed … standards for Matagorda and Lavaca Bays generally track the recommendations of the stakeholders."*

Matagorda Bay Health Evaluation Studies

- Conducted circa 2004 to 2008
- Culminated in a final report – December 2008
- Recommended inflow criteria to Matagorda Bay based on multidisciplinary studies:

	Threshold	MBHE 1	MBHE 2	MBHE 3	MBHE 4	Long-term Volume and Variability
Design Area	Delta	Delta Edge to Mad Island Transect	Delta Edge to Mad Island Transect	Delta Edge to Mad Island Transect	Delta Edge to Mad Island Transect	EAMB
Salinity range across area (ppt)	< 30[1]	27-29	24-26	20-23	15-18	Average[4]
Trophic Level						
Primary Production	Low	Low	Low	Moderate	High	Normal[5]
Oyster Health	Refuge[2]	Refuge[2]	Poor[2]	Fair	Good	Normal[5]
Benthic Condition	Fair / Poor	Poor	Fair	Good	Peak	Normal[5]
Marsh Productivity	Fair	Fair	Good	Good	Good	Normal[5]
Shellfish Habitat	Good[3] / Poor	Good[3] / Poor	Selected[3] / Fair / Poor	Selected[3] / Fair	Selected[3] / Good	Normal[5]
Forage Fish Habitat	Poor / Refuge	Poor / Refuge	Poor	Fair	Good	Normal[5]

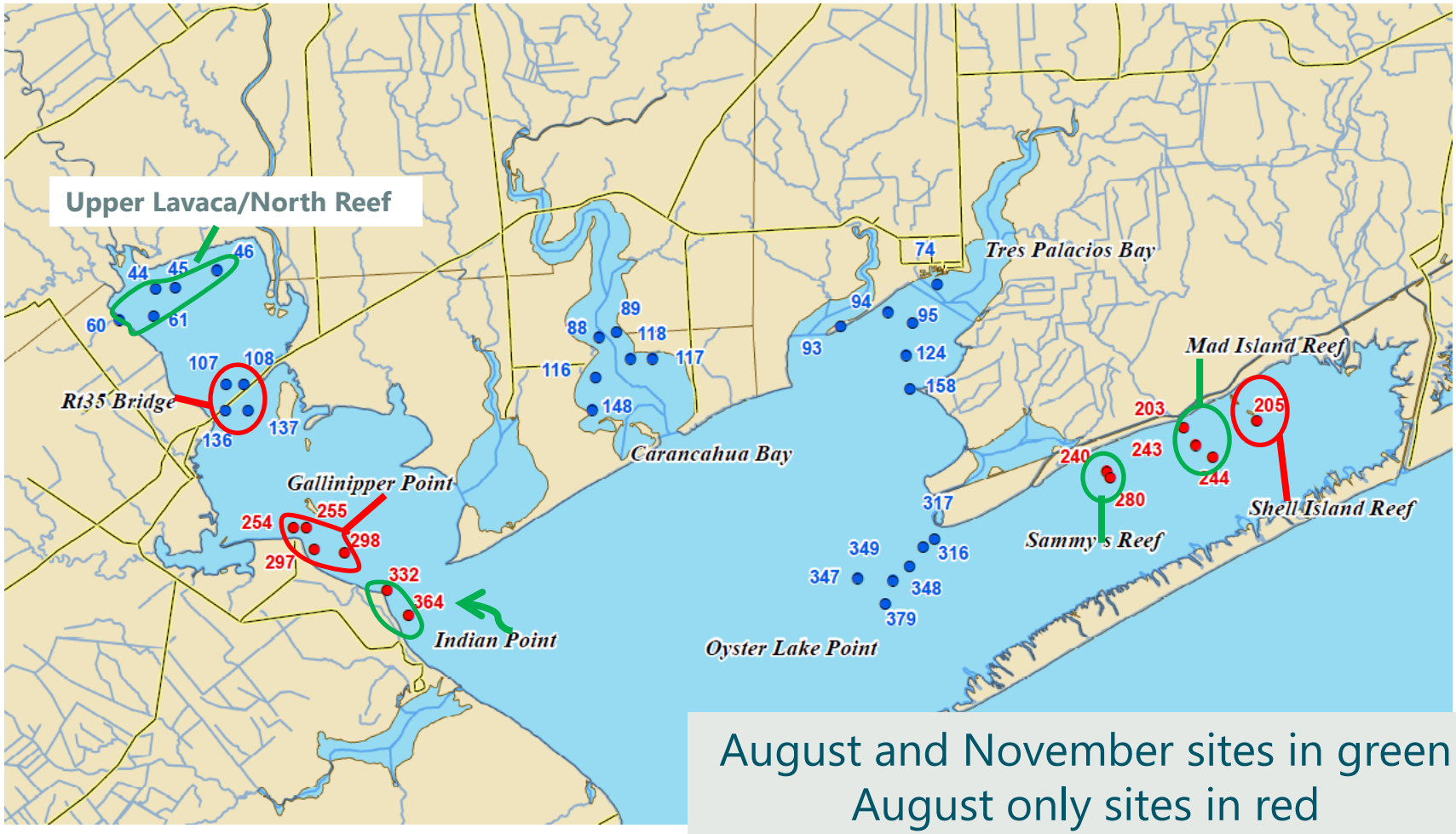
To be evaluated in this effort

Source: 2008 MBHE Final Report, Table 11

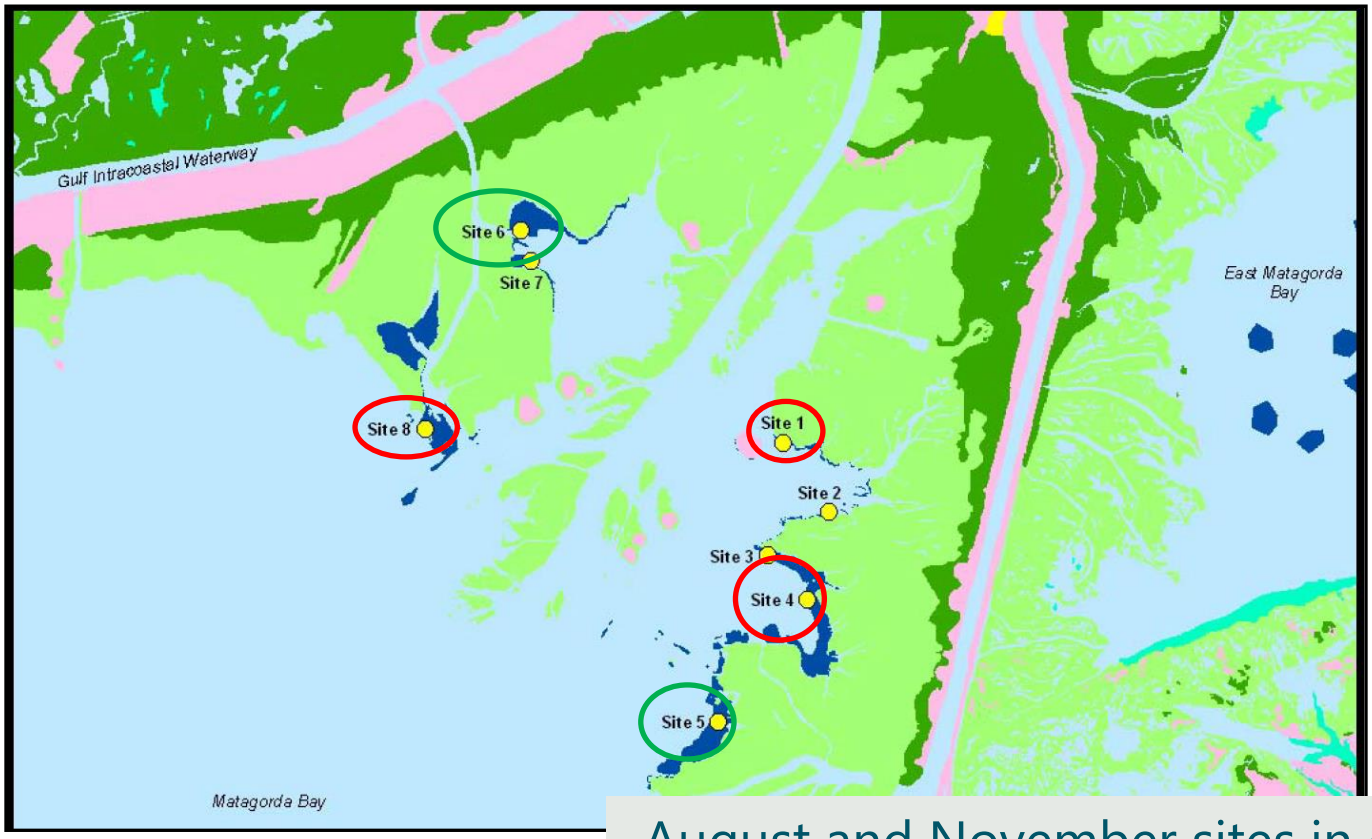
Oysters and Dermo

- Two field collections: August and November 2014
  - August event: 7 reefs and 5 locations in CR Delta
  - November event: 4 reefs and 2 locations in CR Delta
- Obtained all available TPWD dermo data (through August 2011)
  - Approximately doubles size of dataset
- Will obtain TPWD oyster data through Fall 2014
- Update MBHE calculations using expanded dataset

Submerged Reef 2014 Sampling Locations

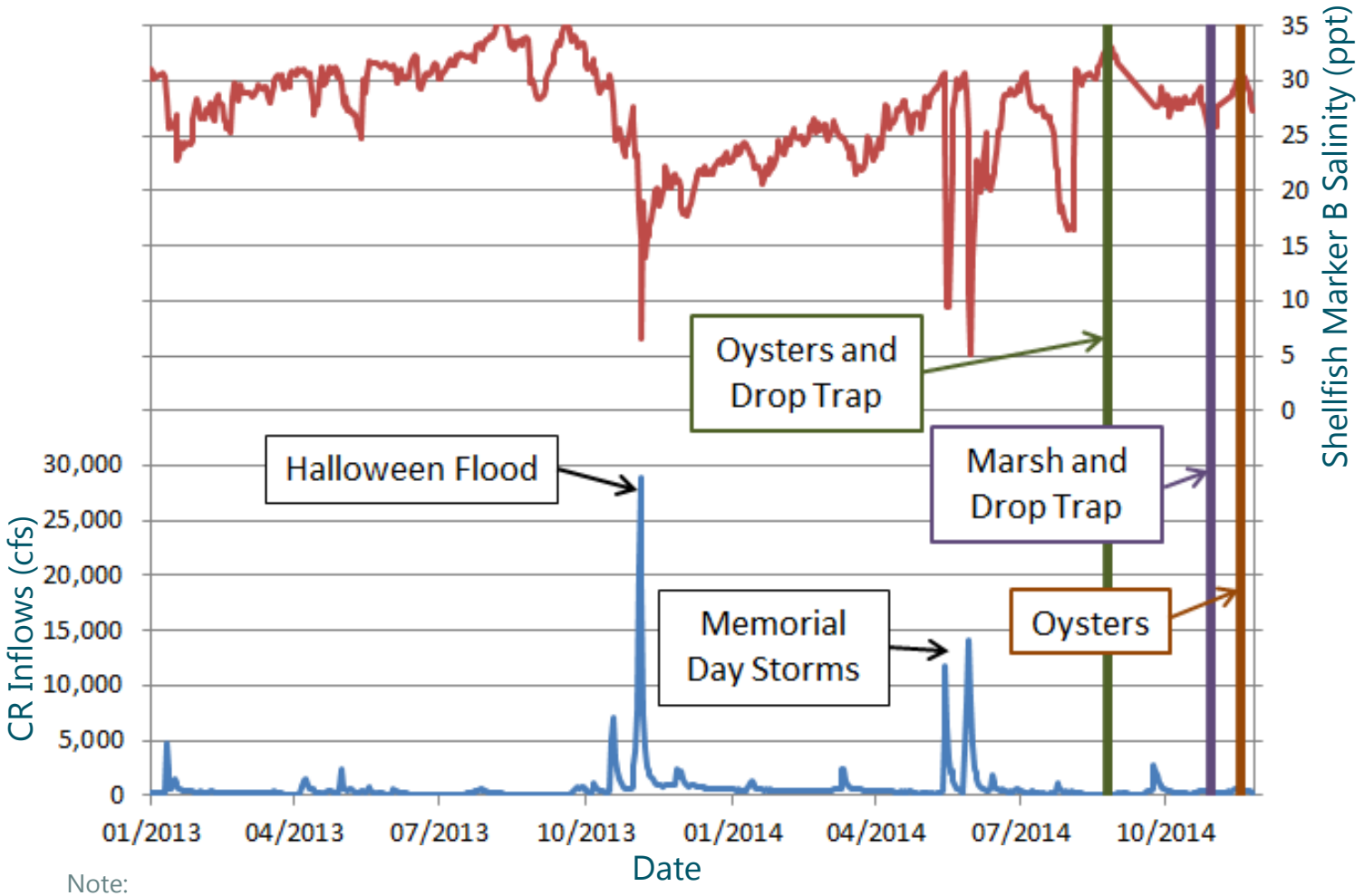


Colorado River Delta 2014 Sampling Locations



August and November sites in green
August only sites in red

Field Data Collection



Note:
Estimated Colorado River inflows were obtained from LCRA and are based on estimated Bay City flows minus downstream diversions.

Preliminary August 2014 Dermo Data

Station	Collection Date	Oyster Size Range (mm)	T (^{o}C)	S (ppt)	Dermo Percent Infected	Dermo Infection Intensity
Sammy's Reef	8/25/14	76-101	31.0	31.5	28.6	1.33
Galliniper Point	8/25/14	83-111	30.5	30.2	66.7	1.12
Indian Point	8/25/14	76-113	30.4	31.0	41.7	1.92
Mad Island Reef	8/25/14	78-141	32.0	32.0	66.7	1.08
Bridge Reef	8/25/14	81-131	30.6	26.5	50.0	0.83
North Reef	8/25/14	90-119	30.2	21.0	0	0
Shell Island	8/25/14	85-124	33.3	31.8	0.75	1.11
CRD 1	9/1/14	90-150	27.8	27.9	83.3	1.20
CRD 4	9/1/14	100-127	28.3	27.2	91.7	1.09
CRD 5	9/1/14	78-110	28.8	27.3	75.0	1.30
CRD 6	9/1/14	93-129	30.1	26.0	91.7	0.88
CRD 8	9/1/14	83-114	29.1	27.8	91.7	1.39

Oyster and Dermo Analysis Approach

- Oyster Condition Index
  - Based on dredge pull counts, regression against
    - Ten-year freshet frequency
    - Two-year average salinity
    - Two-year winter temperature average
- Dermo Condition Index
  - Based on dermo intensity, regression against
    - Two-year average salinity
    - Two-year winter temperature average
    - Three-month rolling temperature average
- Project team will consider other regression terms

Shellfish and Forage Fish

- Two throw trap field collections in September and October 2014
  - 3 sites in Lavaca Bay
  - 3 sites in Colorado River Delta
  - 6 drop traps at each site
    - 3 shallow no-bottom
    - 3 marsh edge
    - Total of 36 drop traps/sampling effort
- Results
  - Number of individuals and number of species found
  - Species density/m^2 in open vs. marsh edge habitat
  - Densities compared to previous years' sampling efforts

Data from event in Fall 2008 will also be used.

Marsh Productivity

- Biomass measured October 2014
  - 3 transects in Lavaca Bay
  - 3 transects in Colorado River Delta
  - Same sites as drop trap
    - 2 low marsh
    - 2 interior marsh samples at each site
    - Total of 24 vegetation samples
- Results
  - Estimate salinity influences on species diversity
  - Determine if aboveground biomass varies between marsh sites using ANOVA
  - Compare to previous years' biomass sampling

Data from event in Fall 2008 will also be used.

Rangia

- *Rangia* to be collected soon
  - Targeting 50 samples
  - Location: Lavaca and Colorado River Deltas
- Samples to be delivered to Dr. Bryan Black
  - Will be combined with similar samples from San Antonio Bay to form robust dataset for statistical analysis
    - Recruitment success and growth as a function of salinity, inflows, and temperature


Source: Beaumontenterprise.com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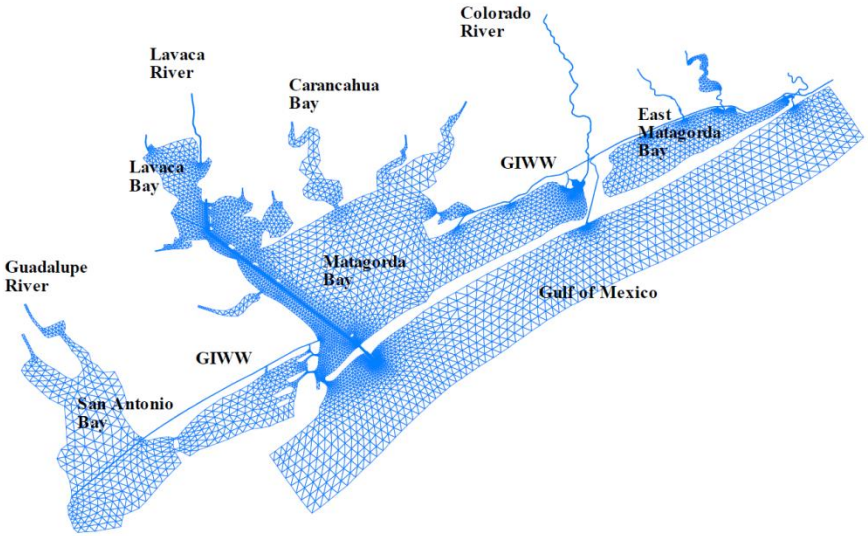
Hydrodynamic Modeling

- MBHE RMA2/4 model
  - Has not been updated
  - Is not supported by TWDB
- Propose to use TxBLEND
  - Is routinely updated
  - Is supported by TWDB
- Will compare predictions of inflows versus salinity to ascertain if model differences are meaningful



Source: TWDB 2011 TxBLEND Report

Summary

- Updating studies that underpin the flow standards
- Field work is going smoothly
  - Weather has cooperated
- Data processing and analysis has started

Project team may recommend changes to salinity levels corresponding to ecological conditions.

Project team will not recommend changes to flow standards – that is up to the BBASC.

Questions/Discussion